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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/054,847

01/25/2002

Howard E. Rhodes

M4065.0295/P295-A

9091

24998

7590

11/18/2003

DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP

2101 L STREET NW

WASHINGTON, DC 20037-1526

EXAMINER

THOMAS, TONIAE M

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 11/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/054,847

Applicant(s)

RHODES, HOWARD E.

Examiner

Toniae M. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 90-116 is/are pending in the application.
- 4a) Of the above claim(s) 106-111 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 90-105 and 112-116 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is an official response to the amendment filed on 05 September 2003. Currently, claims 90-116 are pending.

Election/Restrictions

2. Applicant's election without traverse of the species of figs. 1-12, which is drawn to claims 90-105 and 112-116, in Paper No. 5 is acknowledged. Claims 106-111 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. *Claims 90-105 and 112-116 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rhodes (US 6,232,626 B1).*

Claims 90-105 and 112-116 are unpatentable over the Rhodes patent as set forth in the Office action mailed on 19 June 2003.

Rhodes discloses a method of forming a photosensor (figs. 5-11 and accompanying text). The method comprises the steps of: providing a semiconductor substrate 16 having a doped layer 20 of a first conductivity type (fig. 6); forming a

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trench 104 in the doped layer, the trench having a plurality of sidewalls and a bottom (fig. 7); doping the sides and bottom of the trench to form a doped region 26 of a second conductivity type (fig. 9); and forming an insulating layer 100 on the sides and bottom of the trench over the doped region (fig. 10).

The photosensor can be a photodiode sensor (col. 8, lines 50-54).

The method further comprises a step of forming a conductive layer 102 on substantially all of an upper surface of the insulating layer (fig. 11).

The photosensor can be a photogate sensor (col. 8, lines 50-54).

Forming the conductive layer comprises a chemical vapor deposition step (col. 8, line 63-col. 9, line 1).

Forming the conductive layer comprises a sputtering step (col. 8, line 63-col. 9, line 1).

The insulating layer is a layer of silicon dioxide (col. 8, lines 44-50).

The first conductivity type is p-type, and the second conductivity type is n-type (col. 6, line 67-col. 7, line 3 and col. 7, lines 3-6).

The semiconductor substrate can be a silicon substrate (col. 6, lines 46-56).

Forming the trench comprises a reactive ion etching process (col. 7, lines 49-58).

The doping step comprises ion implantation (col. 8, lines 12-26).

The doping step comprises multiple angled ion implantation (col. 8, lines 12-26).

The multiple angled ion implantation comprises four orthogonal angled implants at a dose of 1×10^{12} to 1×10^{11} ions/cm², wherein a resist is placed on top of the substrate

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while implanting, and wherein the angle of implantation for each angled implant is greater than 0, where $\tan \theta_c = [(t + d)/(w)]$, where t is the thickness of the resist, d is the depth of the trench, and w is the width of the trench (col. 8, lines 12-26).

The dose of each implant can be 1×10^{13} to 1×10^{15} ions/cm² (col. 8, lines 12-26).

The dose of each implant can be 5×10^{13} ions/cm² (col. 8, lines 12-26).

Rhodes lacks anticipation only in not forming a plurality of trenches in the doped layer 20. However, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to form a plurality of trenches in the doped layer, since the court has held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced (*In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960)).

Response to Arguments

4. Applicant's arguments filed 05 September 2003 with respect to Rhodes (US 6,232,626) have been fully considered but they are not persuasive.

The Applicant argues that Rhodes does not teach or suggest "forming a plurality of trenches in said doped region to define a photosensitive area, for a photosensor." As discussed above, it is the examiner's position that it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Rhodes by forming a plurality of trenches in the doped layer, since the court has held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced (*In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960)).

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5. The amendment filed on 05 September 2003 has overcome the following rejections made of record in the Office action mailed on 19 June 2003: the rejection of claims 90, 92, 96-103, 112, 115, and 116 under 35 USC §102(b), and the rejection of claims 94 and 95 under 35 USC §103(a). Accordingly, the rejections have been withdrawn.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (703) 305-7646. The examiner can normally be reached on Monday through Thursday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (703) 308-4905. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JMJ

12 November 2003


AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800